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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/762,786	OLDHAM ET AL.	
	Examiner	Art Unit	
	Robert T. Crow	1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 March 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-10,15-21 and 81-90* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 4-10, 15-21, and 81-90* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 22 March 2007 has been entered.

Status of the Claims

2. This action is in response to papers filed 22 March 2007 in which claims 1 and 86 were amended, no claims were canceled, and new claims 88-90 were added. All of the amendments have been thoroughly reviewed and entered.

The previous rejections under 35 U.S.C. 112, second paragraph, are withdrawn in view of the amendments.

The previous rejections under 35 U.S.C. 102(b) and 35 U.S.C. 103(a) not reiterated below are withdrawn in view of the amendments. Applicant's arguments have been thoroughly reviewed and are addressed following the rejections necessitated by the amendments.

Claims 1, 4-10, 15-21, and 81-90 are under prosecution.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 4-6, 8-9, 15, 17, 82, 84, and 86 are rejected under 35 U.S.C. 102(b) as being anticipated by Unger et al (U.S. Patent Application Publication No. US 2002/0029814 A1, published 14 March 2002).

Regarding claim 1, Unger et al teach a microfluidic device. In a single exemplary embodiment, Unger et al teach the device illustrated in Figure 52C, which shows a sample-containment region plate; namely, elastomeric portion 5604 comprising bridge 5614. Bridge 5614 is the sample containment region formed in plate 5604 and is part of fluid channel 5606 (paragraph 0422). Biopolymer synthesis is carried out in the channels (paragraph 0292); therefore, bridge 5614 is a sample containment region capable of containing a sample within the sample containment plate. Unger et al teach the device further comprises a lid plate disposed on the sample containment region plate; namely, elastomeric portion 5600 of Figure 52C. Elastomeric portion 5600 has an outlet opening in the form of the end of channel 5606, which is in fluid communication with sample containment region 5614 and extends through lid plate 5600 to the top surface (paragraph 0422), wherein the top surface is the surface of elastomeric portion 5600 opposite from elastomeric portion 5606 and shown juxtaposed with the open un-numbered block at the bottom of Figure 52C.

The device of Unger et al also comprises at least one sealing plug disposed in and plugging an end of the inlet channel; namely, stop valves close the opening to dead end chambers (paragraph 0468). Because the chamber is a dead-end chamber and because the fluid channels are interconnected (Figure 70), a stop valve sealing a dead end chamber is a plug disposed in and plugging an end of the input channel. Unger et al also teach the valves are made of the elastomers of the invention (paragraph 0175) which comprises the non-porous, gas permeable polysiloxane material of claim 3 (paragraphs 0190-0191); thus, the plugs are non-porous and gas permeable.

Unger et al also teach a gas-impermeable layer covers the device; namely, the device is sandwiched between two substrates (paragraph 0096), wherein the substrates are glass (paragraph 0127), which is gas-impermeable.

Regarding claims 4-6, Unger et al teach the device of claim 1, wherein the non-porous, gas permeable material comprises a polydialkylsiloxane material; namely, the elastomeric materials comprise polydimethylsiloxane (paragraphs 0190 and 0191).

Regarding claim 8, Unger et al teach the device of claim 1, wherein a channel is provided between the outlet opening and the sample containment region; namely, channel 5610 connects containment region 5614 and outlet opening 5606 (Figure 52C and paragraph 0422). Unger et al also teach the channels have control lines that function as micro-valves (paragraph 0010).

Regarding claim 9, Unger et al teach the device of claim 8, wherein the valve is in a closed state and the fluid communication through the channel is interrupted; namely, the valves close to seal the channel (paragraph 0016).

Regarding claim 15, Unger et al teach the device of claim 1, wherein the at least one sample-containment region contains a sample therein; namely, biopolymer synthesis is carried out in the channels (paragraph 0292).

Regarding claim 17, Unger et al teach the device of claim 1, wherein the sample containment region further comprises a nucleic acid probe; namely, nucleic acid synthesis is carried out in the channels (paragraph 0292).

Regarding claim 82, Unger et al teach the device of claim 1, further comprising a substrate support disposed on a bottom surface of the sample containment region plate; namely, non-channel bearing faces are placed into contact and sandwiched between two substrates (paragraph 0096).

Regarding claim 84, Unger et al teach the device of claim 82, wherein the substrate support comprises a polysiloxane material; namely, the substrates are elastomers (paragraph 0127), wherein the elastomers comprise polydimethylsiloxane (paragraphs 0190 and 0191).

Regarding claim 86, Unger et al teach a microfluidic device. In a single exemplary embodiment, Unger et al teach the device illustrated in Figure 52C, which shows a through hole plate; namely, elastomeric portion 5600 comprising the two (i.e., a plurality of) through-holes 5606 and having a top

surface and a bottom surface. The device of Unger et al further comprises a lid plate in the form of layer 5604, which has a top surface and comprises input channel (i.e., bridge) 5614, which provides fluid communication between through-holes 5606 on the top face of plate 5600 because it is a fluid channel in a plate on top of plate 5600 (paragraph 0422).

The device of Unger et al also comprises at least one sealing plug disposed in and plugging an end of the input channel; namely, stop valves close the openings to dead end chambers (paragraph 0468). Because the chamber is a dead-end chamber and because the fluid channels are interconnected (Figure 70), a stop valve sealing a dead end chamber is a plug disposed in and plugging an end of the input channel. Unger et al also teach the valves are made of the elastomers of the invention (paragraph 0175) which comprises the non-porous, gas permeable polysiloxane material of claim 3 (paragraphs 0190-0191); thus, the plugs are non-porous and gas permeable.

Unger et al also teach a gas-impermeable layer covers the device; namely, the device is sandwiched between two substrates (paragraph 0096), wherein the substrates are glass (paragraph 0127). The glass is gas-impermeable, and the upper substrate is the covering layer, and the bottom substrate is the substrate surface on the bottom of the support.

Response to Arguments

Applicant's arguments filed 22 March 2007 (i.e., the "Remarks") have been fully considered but they are not persuasive for the reason(s) listed below.

A. Applicant argues on page 14 of the Remarks that Unger does not teach a gas-impermeable cover, and that one of skill in the art would not be motivated to cover the device of Unger et al with a gas-impermeable cover because it would defeat the purpose of using the gas venting material of Unger et al.

However, Unger et al does teach a gas-impermeable layer covering the device; namely, the device comprising the sample containment region plate and lid plate is sandwiched between two substrates

(paragraph 0096), wherein the substrates are glass (paragraph 0127), which is gas-impermeable. Thus, the glass plates are a gas -impermeable cover.

Applicant's argument that one of skill in the art would not be motivated to cover the device of Unger et al with a gas-impermeable cover is therefore moot because Unger et al **anticipate** the limitation of a gas-impermeable cover, and teach specific embodiments of the instantly claimed invention comprising the gas-permeable cover.

B. Applicant argues on page 14 of the Remarks that paragraph 0450 does not describe a plug that is gas permeable.

Paragraph 0450 was cited on page 4 of the previous Office Action for the teaching that all but one of the channel entries are plugged; i.e., the device of Unger et al has at least one plug. The examiner has further more narrowly interpreted the instantly claimed plugs as, stop valves close the opening to dead end chambers (paragraph 0468). Because the chamber is a dead-end chamber and because the fluid channels are interconnected (Figure 70), a stop valve sealing a dead end chamber is a plug disposed in and plugging an end of the input channel. Unger et al also teach the valves are made of the elastomers of the invention (paragraph 0175) which comprises the non-porous, gas permeable polysiloxane material of claim 3 (paragraphs 0190-0191); thus, the plugs are non-porous and gas permeable. Hence, in the instant Office Action, paragraph 0450 of Unger et al has not been relied upon for a teaching of the plugs.

Thus, contrary to applicant's assertion on page 14 of the Remarks, Unger et al teach at least one gas permeable plug that plugs the outlet opening in the form of a gas permeabe polysiloxane stop valve plugging an end of the outlet as described above.

C. Applicant argues on pages 14-15 of the Remarks that Unger et al do not teach a gas permeable plug, and that the examiner's conclusion is based on hindsight consideration.

However, as noted above, the device of Unger et al also comprises at least one sealing plug disposed in and plugging an end of the inlet channel; namely, stop valves close the opening to dead end chambers (paragraph 0468). Because the chamber is a dead-end chamber and because the fluid channels

are interconnected (Figure 70), a stop valve sealing a dead end chamber is a plug disposed in and plugging an end of the input channel. Unger et al also teach the valves are made of the elastomers of the invention (paragraph 0175) which comprises the non-porous, gas permeable polysiloxane material of claim 3 (paragraphs 0190-0191). Applicant admits that on page 14 of the Remarks that the material of Unger et al are gas venting (i.e., non-porous and gas permeable); thus, the plugs are non-porous and gas permeable.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

D. Applicant argues on pages 14-15 of the Remarks that Unger et al teaches in paragraph 0453 that compressed gas in a channel of the device diffuses through a block having a flow channel, and thus does not teach diffusing gas through the plug, or a material for the plugs.

It is noted that a reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). See also *Upsher-Smith Labs. v. Pamlab, LLC*, 412 F.3d 1319, 1323, 75 USPQ2d 1213, 1215 (Fed. Cir. 2005)(reference disclosing optional inclusion of a particular component teaches compositions that both do and do not contain that component); Celeritas Technologies Ltd. v. Rockwell International Corp., 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998) (The court held that the prior art anticipated the claims even though it taught away from the claimed invention. "The fact that a modem with a single carrier data signal is shown to be less than optimal does not vitiate the fact that it is disclosed."). Thus, the teaching of Unger et al in paragraph 0453 that **a single embodiment** of the invention vents a compressed gas through a

channel encompasses the alternate embodiment wherein the channel is **not** used to vent a compressed gas. See MPEP § 2123 [R-5].

Further, paragraph 0453 of Unger et al teaches that gasses diffuse out of the elastomer material. As noted above, Unger et al teach plugs in the form of stop valves close the opening to dead end chambers (paragraph 0468). Applicant admits that on page 14 of the Remarks that the material of Unger et al are gas venting (i.e., non-porous and gas permeable); thus, the plugs are non-porous and gas permeable.

In addition, in response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., diffusing gas through the plug) are not recited in the rejected **apparatus** claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Furthermore, the courts have held that "while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function." *In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997). In addition, "[A]pparatus claims cover what a device *is*, not what a device *does*." *Hewlett-Packard Co. v. Bausch &Lomb Inc.*, 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990) (emphasis in original). Therefore, the various uses recited in the arguments (e.g., diffusing gas through the plug) fail to define additional structural elements to the device of claim 1. Because Unger et al teach the structural elements of claim 1 as described above, the claim is anticipated by Unger et al. See MPEP § 2114.

E. Applicant's arguments on pages 18-19 of the Remarks with respect to the rejection of claim 86 under 35 USC 103(a) have been considered but are moot in view of the new ground(s) of rejection necessitated by the amendments.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Unger et al (U.S. Patent Application Publication No. US 2002/0029814 A1, published 14 March 2002) in view of Dvornic et al (U.S. Patent Application Publication No. US 2003/0088024 A1, issued 8 May 2003).

Regarding claim 7, Unger et al teach the microfluidic device of claim 1. In a single exemplary embodiment, Unger et al teach the device illustrated in Figure 52C, which shows a sample-containment region plate; namely, elastomeric portion 5604 comprising bridge 5614. Bridge 5614 is the sample containment region formed in plate 5604 and is part of fluid channel 5606 (paragraph 0422). Biopolymer

synthesis is carried out in the channels (paragraph 0292); therefore, bridge 5614 is a sample containment region capable of containing a sample within the sample containment plate. Unger et al teach the device further comprises a lid plate disposed on the sample containment region plate; namely, elastomeric portion 5600 of Figure 52C. Elastomeric portion 5600 has an outlet opening in the form of the end of channel 5606, which is in fluid communication with sample containment region 5614 and extends through lid plate 5600 to the top surface (paragraph 0422), wherein the top surface is the surface of elastomeric portion 5600 opposite from elastomeric portion 5606 and shown juxtaposed with the open un-numbered block at the bottom of Figure 52C.

The device of Unger et al also comprises at least one sealing plug disposed in and plugging an end of the inlet channel; namely, stop valves close the opening to dead end chambers (paragraph 0468). Because the chamber is a dead-end chamber and because the fluid channels are interconnected (Figure 70), a stop valve sealing a dead end chamber is a plug disposed in and plugging an end of the input channel. Unger et al also teach the valves are made of the elastomers of the invention (paragraph 0175) which comprises the non-porous, gas permeable polysiloxane material of claim 3 (paragraphs 0190-0191); thus, the plugs are non-porous and gas permeable.

Unger et al also teach a gas-impermeable layer covers the device; namely, the device comprising the sample containment region plate and lid plate is sandwiched between two substrates (paragraph 0096), wherein the substrates are glass (paragraph 0127), which is gas-impermeable.

While Unger et al teach the crosslinking of polysiloxanes (paragraph 0174), Unger et al are silent with respect to weight percents.

However, Dvornic et al teach crosslinked hyperbranched polysiloxanes comprising the reaction product of an uncrosslinked reactive polysiloxane monomer. In the single exemplary embodiment of Example 1, Dvornic et al teach 45.83 g of tetrakis (dimethylsiloxy)silane and about 0.01 to about 50 percent by weight of a polysiloxane crosslinker (e.g., 30 g of 1,3-divinyltetraethoxydisiloxane) with the added advantage that the polymers allow for the attachment of a variety of molecules (paragraph 0005).

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the crosslinked polysiloxane device as taught by Unger et al with the crosslinked polysiloxane polymers as taught by Dvornic et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted a microfluidic device having the added advantage of being made of polymers that allow for the attachment of a variety of molecules as explicitly taught by Dvornic et al (paragraph 0005).

8. Claims 1, 10, 19-21, and 81 are rejected under 35 U.S.C. 103(a) as being unpatentable over Unger et al (U.S. Patent Application Publication No. US 2002/0029814 A1, published 14 March 2002) in view of Anderson et al (Anal. Chem., vol. 72, pages 3158-3164, (15 July 2000)).

Regarding claim 10, Unger et al teach the microfluidic device of claim 1 In a single exemplary embodiment, Unger et al teach the device illustrated in Figure 52C, which shows a sample-containment region plate; namely, elastomeric portion 5604 comprising bridge 5614. Bridge 5614 is the sample containment region formed in plate 5604 and is part of fluid channel 5606 (paragraph 0422). Biopolymer synthesis is carried out in the channels (paragraph 0292); therefore, bridge 5614 is a sample containment region capable of containing a sample within the sample containment plate. Unger et al teach the device further comprises a lid plate disposed on the sample containment region plate; namely, elastomeric portion 5600 of Figure 52C. Elastomeric portion 5600 has an outlet opening in the form of the end of channel 5606, which is in fluid communication with sample containment region 5614 and extends through lid plate 5600 to the top surface (paragraph 0422), wherein the top surface is the surface of elastomeric portion 5600 opposite from elastomeric portion 5606 and shown juxtaposed with the open un-numbered block at the bottom of Figure 52C.

The device of Unger et al also comprises at least one sealing plug disposed in and plugging an end of the inlet channel; namely, stop valves close the openings to dead end chambers (paragraph 0468).

Because the chamber is a dead-end chamber and because the fluid channels are interconnected (Figure 70), a stop valve sealing a dead end chamber is a plug disposed in and plugging an end of the input channel. Unger et al also teach the valves are made of the elastomers of the invention (paragraph 0175) which comprises the non-porous, gas permeable polysiloxane material of claim 3 (paragraphs 0190-0191); thus, the plugs are non-porous and gas permeable.

Unger et al also teach a gas-impermeable layer covers the device; namely, the device comprising the sample containment region plate and lid plate is sandwiched between two substrates (paragraph 0096), wherein the substrates are glass (paragraph 0127), which is gas-impermeable.

Unger et al teach the device comprises a plurality of channels (paragraph 0020) and chambers (paragraph 0279), which are interpreted as being synonymous because both channels and chambers (i.e., reservoirs) are used for performing biopolymer synthesis reactions (paragraph 0292). Unger et al also teach a plurality of non-porous, gas-permeable sealing plugs; namely, the device comprises more than one stop valve (paragraph 0468), which is the plug.

While Unger et al teach the bridging structure of Figure 52C, which is the sample-containment region formed in the sample containment region plate of instant claim 1, Unger et al do not specifically teach a plurality of the bridging structures of Figure 52C (i.e., a plurality of sample-containment regions) formed in the plate.

However, Anderson et al teach a plurality of bridging channel structures in a microfluidic device; namely, the coiled channel crossings of Figure 5. The plurality of channel crossings are part of a device fabricated from polydimethylsiloxane using a sample containment region plate and a lid plate (i.e., two masters; caption of Figure 5) and the plurality of channel crossings has the added advantage of providing a structure that dissipates heat effectively and acts as a device for sorting and binning samples (i.e., particles; page 3161, column 2, last paragraph).

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the device comprising the sample containment regions as

taught by Unger et al with the plurality of regions as taught by Anderson et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a microfluidic device having the added advantage of dissipating heat effectively and acting as a device for sorting and binning samples as explicitly taught by Anderson et al (page 3161, column 2, last paragraph).

Regarding claim 19, Unger et al teach the microfluidic device of claim 1 In a single exemplary embodiment, Unger et al teach the device illustrated in Figure 52C, which shows a sample-containment region plate; namely, elastomeric portion 5604 comprising bridge 5614. Bridge 5614 is the sample containment region formed in plate 5604 and is part of fluid channel 5606 (paragraph 0422). Biopolymer synthesis is carried out in the channels (paragraph 0292); therefore, bridge 5614 is a sample containment region capable of containing a sample within the sample containment plate. Unger et al teach the device further comprises a lid plate disposed on the sample containment region plate; namely, elastomeric portion 5600 of Figure 52C. Elastomeric portion 5600 has an outlet opening in the form of the end of channel 5606, which is in fluid communication with sample containment region 5614 and extends through lid plate 5600 to the top surface (paragraph 0422), wherein the top surface is the surface of elastomeric portion 5600 opposite from elastomeric portion 5606 and shown juxtaposed with the open un-numbered block at the bottom of Figure 52C.

The device of Unger et al also comprises at least one sealing plug disposed in and plugging an end of the inlet channel; namely, stop valves close the openings to dead end chambers (paragraph 0468). Because the chamber is a dead-end chamber and because the fluid channels are interconnected (Figure 70), a stop valve sealing a dead end chamber is a plug disposed in and plugging an end of the input channel. Unger et al also teach the valves are made of the elastomers of the invention (paragraph 0175) which comprises the non-porous, gas permeable polysiloxane material of claim 3 (paragraphs 0190-0191); thus, the plugs are non-porous and gas permeable.

Unger et al also teach a gas-impermeable layer covers the device; namely, the device comprising the sample containment region plate and lid plate is sandwiched between two substrates (paragraph 0096), wherein the substrates are glass (paragraph 0127), which is gas-impermeable.

Unger et al teach the device comprises a plurality of channels (paragraph 0020) and chambers (paragraph 0279), which are interpreted as being synonymous because both channels and chambers (i.e., reservoirs) are used for performing biopolymer synthesis reactions (paragraph 0292).

While Unger et al teach the bridging structure of Figure 52C, which is the sample-containment region formed in the sample containment region plate of instant claim 1, Unger et al do not specifically teach a plurality of the bridging structures of Figure 52C (i.e., a plurality of sample-containment regions) formed in the plate.

However, Anderson et al teach a plurality of bridging channel structures in a microfluidic device; namely, the coiled channel crossings of Figure 5. The plurality of channel crossings are part of a device fabricated from polydimethylsiloxane using a sample containment region plate and a lid plate (i.e., two masters; caption of Figure 5) and the plurality of channel crossings has the added advantage of providing a structure that dissipates heat effectively and acts as a device for sorting and binning samples (i.e., particles; page 3161, column 2, last paragraph).

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the device comprising the sample containment regions as taught by Unger et al with the plurality of regions as taught by Anderson et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a microfluidic device having the added advantage of dissipating heat effectively and acting as a device for sorting and binning samples as explicitly taught by Anderson et al (page 3161, column 2, last paragraph).

Regarding claim 20, the device of claim 19 is discussed above. Unger et al also teach a plurality of regions containing nucleic acid probes; namely, the device comprises a plurality of channels where solid phase synthesis of nucleic acids is performed (paragraphs 0292-0293 and Figure 32).

Regarding claim 21, the device of claim 19 is discussed above. Unger et al also teach a selected plurality of the regions contain a nucleic acid probe; namely, the device comprises a plurality of channels where solid phase synthesis of nucleic acids is performed in one or more of the plurality of channels (paragraphs 0292-0293 and Figure 32).

Regarding claim 81, Unger et al teach the microfluidic device of claim 1. In a single exemplary embodiment, Unger et al teach the device illustrated in Figure 52C, which shows a sample-containment region plate; namely, elastomeric portion 5604 comprising bridge 5614. Bridge 5614 is the sample containment region formed in plate 5604 and is part of fluid channel 5606 (paragraph 0422). Biopolymer synthesis is carried out in the channels (paragraph 0292); therefore, bridge 5614 is a sample containment region capable of containing a sample within the sample containment plate. Unger et al teach the device further comprises a lid plate disposed on the sample containment region plate; namely, elastomeric portion 5600 of Figure 52C. Elastomeric portion 5600 has an outlet opening in the form of the end of channel 5606, which is in fluid communication with sample containment region 5614 and extends through lid plate 5600 to the top surface (paragraph 0422), wherein the top surface is the surface of elastomeric portion 5600 opposite from elastomeric portion 5606 and shown juxtaposed with the open un-numbered block at the bottom of Figure 52C.

The device of Unger et al also comprises at least one sealing plug disposed in and plugging an end of the inlet channel; namely, stop valves close the openings to dead end chambers (paragraph 0468). Because the chamber is a dead-end chamber and because the fluid channels are interconnected (Figure 70), a stop valve sealing a dead end chamber is a plug disposed in and plugging an end of the input channel. Unger et al also teach the valves are made of the elastomers of the invention (paragraph 0175)

which comprises the non-porous, gas permeable polysiloxane material of claim 3 (paragraphs 0190-0191); thus, the plugs are non-porous and gas permeable.

Unger et al also teach a gas-impermeable layer covers the device; namely, the device comprising the sample containment region plate and lid plate is sandwiched between two substrates (paragraph 0096), wherein the substrates are glass (paragraph 0127), which is gas-impermeable.

Unger et al teach the device comprises a plurality of channels (paragraph 0020) and chambers (paragraph 0279), which are interpreted as being synonymous because both channels and chambers (i.e., reservoirs) are used for performing biopolymer synthesis reactions (paragraph 0292).

While Unger et al teach the bridging structure of Figure 52C, which is the sample-containment region formed in the sample containment region plate of instant claim 1, Unger et al do not specifically teach a plurality of the bridging structures of Figure 52C formed in the plate; i.e., a multiple through-hole plate.

However, Anderson et al teach a plurality of bridging channel structures in a microfluidic device; namely, the coiled channel crossings of Figure 5. The plurality of channel crossings are part of a device fabricated from polydimethylsiloxane using a sample containment region plate and a lid plate (i.e., two masters; caption of Figure 5). The plurality of channel crossings creates a multiple through-hole plate, which has the added advantage of providing a structure that dissipates heat effectively and acts as a device for sorting and binning samples (i.e., particles; page 3161, column 2, last paragraph).

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the device comprising the sample containment regions as taught by Unger et al with the plurality of regions to make a multiple thorough-hole plate as taught by Anderson et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a microfluidic device having the added advantage of dissipating heat effectively and acting as a device for sorting and binning samples as explicitly taught by Anderson et al (page 3161, column 2, last paragraph).

9. Claims 1, 16-18, and 82-83 are rejected under 35 U.S.C. 103(a) as being unpatentable over Unger et al (U.S. Patent Application Publication No. US 2002/0029814 A1, published 14 March 2002) in view of Gong et al (U.S. Patent Application Publication No. US 2003/0138941, published 24 July 2003).

Regarding claim 16, Unger et al teach the device of claim 1. In a single exemplary embodiment, Unger et al teach the device illustrated in Figure 52C, which shows a sample-containment region plate; namely, elastomeric portion 5604 comprising bridge 5614. Bridge 5614 is the sample containment region formed in plate 5604 and is part of fluid channel 5606 (paragraph 0422). Biopolymer synthesis is carried out in the channels (paragraph 0292); therefore, bridge 5614 is a sample containment region capable of containing a sample within the sample containment plate. Unger et al teach the device further comprises a lid plate disposed on the sample containment region plate; namely, elastomeric portion 5600 of Figure 52C. Elastomeric portion 5600 has an outlet opening in the form of the end of channel 5606, which is in fluid communication with sample containment region 5614 and extends through lid plate 5600 to the top surface (paragraph 0422), wherein the top surface is the surface of elastomeric portion 5600 opposite from elastomeric portion 5606 and shown juxtaposed with the open un-numbered block at the bottom of Figure 52C.

The device of Unger et al also comprises at least one sealing plug disposed in and plugging an end of the inlet channel; namely, stop valves close the openings to dead end chambers (paragraph 0468). Because the chamber is a dead-end chamber and because the fluid channels are interconnected (Figure 70), a stop valve sealing a dead end chamber is a plug disposed in and plugging an end of the input channel. Unger et al also teach the valves are made of the elastomers of the invention (paragraph 0175) which comprises the non-porous, gas permeable polysiloxane material of claim 3 (paragraphs 0190-0191); thus, the plugs are non-porous and gas permeable.

Unger et al also teach a gas-impermeable layer covers the device; namely, the device comprising the sample containment region plate and lid plate is sandwiched between two substrates (paragraph

0096), wherein the substrates are glass (paragraph 0127), which is gas-impermeable. Unger et al are silent with respect to dried samples.

However, Gong et al teach a device comprising assay stations (Abstract), which are channels and reaction chambers, having dried nucleic acid primers deposited therein (paragraph 0074) with the added advantage that the dried samples allow pre-application of the samples to the chamber (paragraph 0075).

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the device as taught by Unger et al with the dried samples as taught Gong et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a device having the added advantage of allowing pre-application of the samples to the chamber as explicitly taught by Gong et al (paragraph 0075).

Regarding claim 18, Unger et al teach the device of claim 1. In a single exemplary embodiment, Unger et al teach the device illustrated in Figure 52C, which shows a sample-containment region plate; namely, elastomeric portion 5604 comprising bridge 5614. Bridge 5614 is the sample containment region formed in plate 5604 and is part of fluid channel 5606 (paragraph 0422). Biopolymer synthesis is carried out in the channels (paragraph 0292); therefore, bridge 5614 is a sample containment region capable of containing a sample within the sample containment plate. Unger et al teach the device further comprises a lid plate disposed on the sample containment region plate; namely, elastomeric portion 5600 of Figure 52C. Elastomeric portion 5600 has an outlet opening in the form of the end of channel 5606, which is in fluid communication with sample containment region 5614 and extends through lid plate 5600 to the top surface (paragraph 0422), wherein the top surface is the surface of elastomeric portion 5600 opposite from elastomeric portion 5606 and shown juxtaposed with the open un-numbered block at the bottom of Figure 52C.

The device of Unger et al also comprises at least one sealing plug disposed in and plugging an end of the inlet channel; namely, stop valves close the openings to dead end chambers (paragraph 0468).

Because the chamber is a dead-end chamber and because the fluid channels are interconnected (Figure 70), a stop valve sealing a dead end chamber is a plug disposed in and plugging an end of the input channel. Unger et al also teach the valves are made of the elastomers of the invention (paragraph 0175) which comprises the non-porous, gas permeable polysiloxane material of claim 3 (paragraphs 0190-0191); thus, the plugs are non-porous and gas permeable.

Unger et al also teach a gas-impermeable layer covers the device; namely, the device comprising the sample containment region plate and lid plate is sandwiched between two substrates (paragraph 0096), wherein the substrates are glass (paragraph 0127), which is gas-impermeable.

Unger et al also teach the device of claim 17, wherein the sample containment region further comprises a nucleic acid probe (e.g., the device has an array of DNA probes; paragraph 0402).

Unger et al are silent with respect to dried samples.

However, Gong et al teach a device comprising assay stations (Abstract), which are channels and reaction chambers, having dried nucleic acid primers deposited therein (paragraph 0074) with the added advantage that the dried samples allow pre-application of the samples to the chamber (paragraph 0075).

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the device as taught by Unger et al with the dried samples as taught Gong et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a device having the added advantage of allowing pre-application of the samples to the chamber as explicitly taught by Gong et al (paragraph 0075).

Regarding claim 83, Unger et al teach the device of claim 1. In a single exemplary embodiment, Unger et al teach the device illustrated in Figure 52C, which shows a sample-containment region plate; namely, elastomeric portion 5604 comprising bridge 5614. Bridge 5614 is the sample containment region formed in plate 5604 and is part of fluid channel 5606 (paragraph 0422). Biopolymer synthesis is carried out in the channels (paragraph 0292); therefore, bridge 5614 is a sample containment region capable of

containing a sample within the sample containment plate. Unger et al teach the device further comprises a lid plate disposed on the sample containment region plate; namely, elastomeric portion 5600 of Figure 52C. Elastomeric portion 5600 has an outlet opening in the form of the end of channel 5606, which is in fluid communication with sample containment region 5614 and extends through lid plate 5600 to the top surface (paragraph 0422), wherein the top surface is the surface of elastomeric portion 5600 opposite from elastomeric portion 5606 and shown juxtaposed with the open un-numbered block at the bottom of Figure 52C.

The device of Unger et al also comprises at least one sealing plug disposed in and plugging an end of the inlet channel; namely, stop valves close the openings to dead end chambers (paragraph 0468). Because the chamber is a dead-end chamber and because the fluid channels are interconnected (Figure 70), a stop valve sealing a dead end chamber is a plug disposed in and plugging an end of the input channel. Unger et al also teach the valves are made of the elastomers of the invention (paragraph 0175) which comprises the non-porous, gas permeable polysiloxane material of claim 3 (paragraphs 0190-0191); thus, the plugs are non-porous and gas permeable.

Unger et al also teach a gas-impermeable layer covers the device; namely, the device comprising the sample containment region plate and lid plate is sandwiched between two substrates (paragraph 0096), wherein the substrates are glass (paragraph 0127), which is gas-impermeable.

Unger et al also teach the device of claim 82, which further comprises a substrate support disposed on a bottom surface of the sample containment region plate; namely, non-channel bearing faces are placed into contact and sandwiched between two substrates (paragraph 0096).

Unger et al do not teach a plurality of sample containment regions or a plurality of pads.

However, Gong et al teach a device comprising a lid plate (i.e., a lid) and plurality of sample preparation chambers (paragraph 0053), which are sample containment regions. Gong et al further teach the chambers have sintered glass blocks sealing the lower surface of the chambers (paragraph 0095), which are pads disposed in and sealing the chambers. Gong et al teach the sealed chambers have the

added advantage of allowing sample extraction removal of washing buffers through the seals (paragraph 0079).

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the device as taught by Unger et al with the plurality of sealed chambers as taught Gong et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a device having the added advantage of allowing sample extraction removal of washing buffers through the seals as explicitly taught by Gong et al (paragraph 0079).

10. Claims 1, 82, and 85-87 are rejected under 35 U.S.C. 103(a) as being unpatentable over Unger et al (U.S. Patent Application Publication No. US 2002/0029814 A1, published 14 March 2002) in view of Levin et al (U.S. Patent No. 6,303,389 B1, issued 16 October 2001).

Regarding claim 85, Unger et al teach the microfluidic device of claim 1. Unger et al teach the device of claim 1. In a single exemplary embodiment, Unger et al teach the device illustrated in Figure 52C, which shows a sample-containment region plate; namely, elastomeric portion 5604 comprising bridge 5614. Bridge 5614 is the sample containment region formed in plate 5604 and is part of fluid channel 5606 (paragraph 0422). Biopolymer synthesis is carried out in the channels (paragraph 0292); therefore, bridge 5614 is a sample containment region capable of containing a sample within the sample containment plate. Unger et al teach the device further comprises a lid plate disposed on the sample containment region plate; namely, elastomeric portion 5600 of Figure 52C. Elastomeric portion 5600 has an outlet opening in the form of the end of channel 5606, which is in fluid communication with sample containment region 5614 and extends through lid plate 5600 to the top surface (paragraph 0422), wherein the top surface is the surface of elastomeric portion 5600 opposite from elastomeric portion 5606 and shown juxtaposed with the open un-numbered block at the bottom of Figure 52C.

The device of Unger et al also comprises at least one sealing plug disposed in and plugging an end of the inlet channel; namely, stop valves close the openings to dead end chambers (paragraph 0468). Because the chamber is a dead-end chamber and because the fluid channels are interconnected (Figure 70), a stop valve sealing a dead end chamber is a plug disposed in and plugging an end of the input channel. Unger et al also teach the valves are made of the elastomers of the invention (paragraph 0175) which comprises the non-porous, gas permeable polysiloxane material of claim 3 (paragraphs 0190-0191); thus, the plugs are non-porous and gas permeable.

Unger et al also teach a gas-impermeable layer covers the device; namely, the device comprising the sample containment region plate and lid plate is sandwiched between two substrates (paragraph 0096), wherein the substrates are glass (paragraph 0127), which is gas-impermeable.

Unger et al also teach the device of claim 82, which further comprises a substrate support disposed on a bottom surface of the sample containment region plate; namely, non-channel bearing faces are placed into contact and sandwiched between two substrates (paragraph 0096). Unger et al do not teach the support and the sample-containment region are hinged together.

However, Levin et al teach sassy cassettes for flow-through binding assays (Abstract); namely, Figure 9, which shows the device having a hinge connecting the upper (i.e., top) plate 102 to the assay cassette 10 (i.e., the sample containment plate) and lower plate 104, which is a support. Levin et al also teach the hinged device has the added advantage of allowing access for delivery of the sample to the chamber (column 3, lines 25-55).

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the device as taught by Unger et al with the hinge as taught Levin et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a device having the added advantage of allowing access for delivery of the sample to the chamber as explicitly taught by Levin et al (column 3, lines 25-55).

Regarding claim 87, Unger et al teach the microfluidic device of claim 86. In a single exemplary embodiment, Unger et al teach the device illustrated in Figure 52C, which shows a through hole plate; namely, elastomeric portion 5600 comprising the two (i.e., a plurality of) through-holes 5606 and having a top surface and a bottom surface. The device of Unger et al further comprises a lid plate in the form of layer 5604, which has a top surface and comprises input channel (i.e., bridge) 5614, which provides fluid communication between through-holes 5606 on the top face of plate 5600 because it is a fluid channel in a plate on top of plate 5600 (paragraph 0422).

The device of Unger et al also comprises at least one sealing plug disposed in and plugging an end of the input channel; namely, stop valves close the openings to dead end chambers (paragraph 0468). Because the chamber is a dead-end chamber and because the fluid channels are interconnected (Figure 70), a stop valve sealing a dead end chamber is a plug disposed in and plugging an end of the input channel. Unger et al also teach the valves are made of the elastomers of the invention (paragraph 0175) which comprises the non-porous, gas permeable polysiloxane material of claim 3 (paragraphs 0190-0191); thus, the plugs are non-porous and gas permeable.

Unger et al also teach a gas-impermeable layer covers the device; namely, the device comprising the sample containment region plate and lid plate is sandwiched between two substrates (paragraph 0096), wherein the substrates are glass (paragraph 0127). The glass is gas-impermeable, and the upper substrate is the covering layer, and the bottom substrate is the substrate surface on the bottom of the support.

Unger et al do not teach the support and the sample-containment region are hinged together.

However, Levin et al teach sassy cassettes for flow-through binding assays (Abstract); namely, Figure 9, which shows the device having a hinge connecting the upper (i.e., top) plate 102 to the assay cassette 10 (i.e., the sample containment plate) and lower plate 104, which is a support. Levin et al also teach the hinged device has the added advantage of allowing access for delivery of the sample to the chamber (column 3, lines 25-55).

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the device as taught by Unger et al with the hinge as taught Levin et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a device having the added advantage of allowing access for delivery of the sample to the chamber as explicitly taught by Levin et al (column 3, lines 25-55).

11. Claims 1 and 88 are rejected under 35 U.S.C. 103(a) as being unpatentable over Unger et al (U.S. Patent Application Publication No. US 2002/0029814 A1, published 14 March 2002) in view of Nygren et al (U.S. Patent No. 6,060,237, issued 9 May 2000).

Regarding claim 88, Unger et al teach the microfluidic device of claim 1. In a single exemplary embodiment, Unger et al teach the device illustrated in Figure 52C, which shows a sample-containment region plate; namely, elastomeric portion 5604 comprising bridge 5614. Bridge 5614 is the sample containment region formed in plate 5604 and is part of fluid channel 5606 (paragraph 0422). Biopolymer synthesis is carried out in the channels (paragraph 0292); therefore, bridge 5614 is a sample containment region capable of containing a sample within the sample containment plate. Unger et al teach the device further comprises a lid plate disposed on the sample containment region plate; namely, elastomeric portion 5600 of Figure 52C. Elastomeric portion 5600 has an outlet opening in the form of the end of channel 5606, which is in fluid communication with sample containment region 5614 and extends through lid plate 5600 to the top surface (paragraph 0422), wherein the top surface is the surface of elastomeric portion 5600 opposite from elastomeric portion 5606 and shown juxtaposed with the open un-numbered block at the bottom of Figure 52C.

The device of Unger et al also comprises at least one sealing plug disposed in and plugging an end of the inlet channel; namely, stop valves close the opening to dead end chambers (paragraph 0468). Because the chamber is a dead-end chamber and because the fluid channels are interconnected (Figure

70), a stop valve sealing a dead end chamber is a plug disposed in and plugging an end of the input channel. Unger et al also teach the valves are made of the elastomers of the invention (paragraph 0175) which comprises the non-porous, gas permeable polysiloxane material of claim 3 (paragraphs 0190-0191); thus, the plugs are non-porous and gas permeable.

Unger et al also teach a gas-impermeable layer covers the device; namely, the device comprising the sample containment region plate and lid plate is sandwiched between two substrates (paragraph 0096), wherein the substrates are glass (paragraph 0127), which is gas-impermeable.

Unger et al do not explicitly teach the gas impermeable layer comprises an aluminum film layer.

However, Nygren et al teach glass substrates further comprising an aluminum reflecting layer (column 4, lines 8-27) in the form of a film which has the added advantage of eliminating any back surface reflections during optical detection of assays (column 11, lines 18-35).

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the device as taught by Unger et al with the aluminum film layer as taught Nygren et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a device having the added advantage of eliminating any back surface reflections during optical detection of assays as explicitly taught by Nygren et al (column 11, lines 18-35).

12. Claims 1 and 89 are rejected under 35 U.S.C. 103(a) as being unpatentable over Unger et al (U.S. Patent Application Publication No. US 2002/0029814 A1, published 14 March 2002) in view of Scholes (U.S. Patent No. 3,386,855, issued 4 June 1968).

Regarding claim 89, Unger et al teach the microfluidic device of claim 1. In a single exemplary embodiment, Unger et al teach the device illustrated in Figure 52C, which shows a sample-containment region plate; namely, elastomeric portion 5604 comprising bridge 5614. Bridge 5614 is the sample containment region formed in plate 5604 and is part of fluid channel 5606 (paragraph 0422). Biopolymer

synthesis is carried out in the channels (paragraph 0292); therefore, bridge 5614 is a sample containment region capable of containing a sample within the sample containment plate. Unger et al teach the device further comprises a lid plate disposed on the sample containment region plate; namely, elastomeric portion 5600 of Figure 52C. Elastomeric portion 5600 has an outlet opening in the form of the end of channel 5606, which is in fluid communication with sample containment region 5614 and extends through lid plate 5600 to the top surface (paragraph 0422), wherein the top surface is the surface of elastomeric portion 5600 opposite from elastomeric portion 5606 and shown juxtaposed with the open un-numbered block at the bottom of Figure 52C.

The device of Unger et al also comprises at least one sealing plug disposed in and plugging an end of the inlet channel; namely, stop valves close the opening to dead end chambers (paragraph 0468). Because the chamber is a dead-end chamber and because the fluid channels are interconnected (Figure 70), a stop valve sealing a dead end chamber is a plug disposed in and plugging an end of the input channel. Unger et al also teach the valves are made of the elastomers of the invention (paragraph 0175) which comprises the non-porous, gas permeable polysiloxane material of claim 3 (paragraphs 0190-0191); thus, the plugs are non-porous and gas permeable.

Unger et al also teach a gas-impermeable layer covers the device; namely, the device comprising the sample containment region plate and lid plate is sandwiched between two substrates (paragraph 0096), wherein the substrates are glass (paragraph 0127), which is gas-impermeable.

Unger et al do not explicitly teach the gas impermeable layer (i.e., substrate) comprises a polyolefin film.

However, Scholes teaches glass substrates, in the form of glass articles, comprising a coating of polyolefin (Abstract). The specification does not contain a limiting definition of a "film;" thus, the coating of Scholes is interpreted as a film. Scholes further teaches the polyolefin coating on the glass substrate has the added advantage of reducing damage during handling to a minimum (column 1, lines 65-70).

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the device comprising a glass layer as taught by Unger et al with the glass layer comprising a polyolefin film as taught Scholes with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a device having the added advantage of reducing damage during handling to a minimum as explicitly taught by Scholes (column 1, lines 65-70).

13. Claims 1 and 89-90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Unger et al (U.S. Patent Application Publication No. US 2002/0029814 A1, published 14 March 2002) in view of Zhao et al (U.S. Patent No. 6,306,975 B1, issued 23 October 2001).

Regarding claim 90, Unger et al teach the microfluidic device of claim 1. In a single exemplary embodiment, Unger et al teach the device illustrated in Figure 52C, which shows a sample-containment region plate; namely, elastomeric portion 5604 comprising bridge 5614. Bridge 5614 is the sample containment region formed in plate 5604 and is part of fluid channel 5606 (paragraph 0422). Biopolymer synthesis is carried out in the channels (paragraph 0292); therefore, bridge 5614 is a sample containment region capable of containing a sample within the sample containment plate. Unger et al teach the device further comprises a lid plate disposed on the sample containment region plate; namely, elastomeric portion 5600 of Figure 52C. Elastomeric portion 5600 has an outlet opening in the form of the end of channel 5606, which is in fluid communication with sample containment region 5614 and extends through lid plate 5600 to the top surface (paragraph 0422), wherein the top surface is the surface of elastomeric portion 5600 opposite from elastomeric portion 5606 and shown juxtaposed with the open un-numbered block at the bottom of Figure 52C.

The device of Unger et al also comprises at least one sealing plug disposed in and plugging an end of the inlet channel; namely, stop valves close the opening to dead end chambers (paragraph 0468). Because the chamber is a dead-end chamber and because the fluid channels are interconnected (Figure

70), a stop valve sealing a dead end chamber is a plug disposed in and plugging an end of the input channel. Unger et al also teach the valves are made of the elastomers of the invention (paragraph 0175) which comprises the non-porous, gas permeable polysiloxane material of claim 3 (paragraphs 0190-0191); thus, the plugs are non-porous and gas permeable.

Unger et al also teach a gas-impermeable layer covers the device; namely, the device comprising the sample containment region plate and lid plate is sandwiched between two substrates (paragraph 0096), wherein the substrates are glass (paragraph 0127), which is gas-impermeable.

Unger et al do not explicitly teach the gas impermeable layer (i.e., substrate) comprises a polytetrafluoroethylene layer.

However, Zhao et al teach polytetrafluoroethylene substrates (column 4, lines 23-30), which have the added advantages of being highly inert and have difficulty binding to biological molecules (i.e., substrates; column 3, lines 40-50), which minimizes loss of sample due to non-specific binding of a sample to the cover layer.

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the device as taught by Unger et al with the polytetrafluoroethylene substrate layer as taught Zhao et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a device having the added advantage of minimizing loss of sample due to non-specific binding of a sample to the cover layer as a result of the inertness and difficulty binding to biological molecules found with polytetrafluoroethylene substrate layers as explicitly taught by Zhao et al (column 3, lines 40-50).

Response to Arguments

Applicant's remaining arguments rely on arguments set forth to address the rejections of the claims as anticipated by Unger et al under 35 USC 102(b). These arguments are addressed above on

pages 5-7. Since the arguments regarding the teachings of Unger et al were not persuasive, the remaining rejections of the claims are maintained.

Conclusion

14. No claim is allowed.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert T. Crow whose telephone number is (571) 272-1113. The examiner can normally be reached on Monday through Friday from 8:00 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached on (571) 272-0735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RAM R. SHUKLA, PH.D.
SUPERVISORY PATENT EXAMINER

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